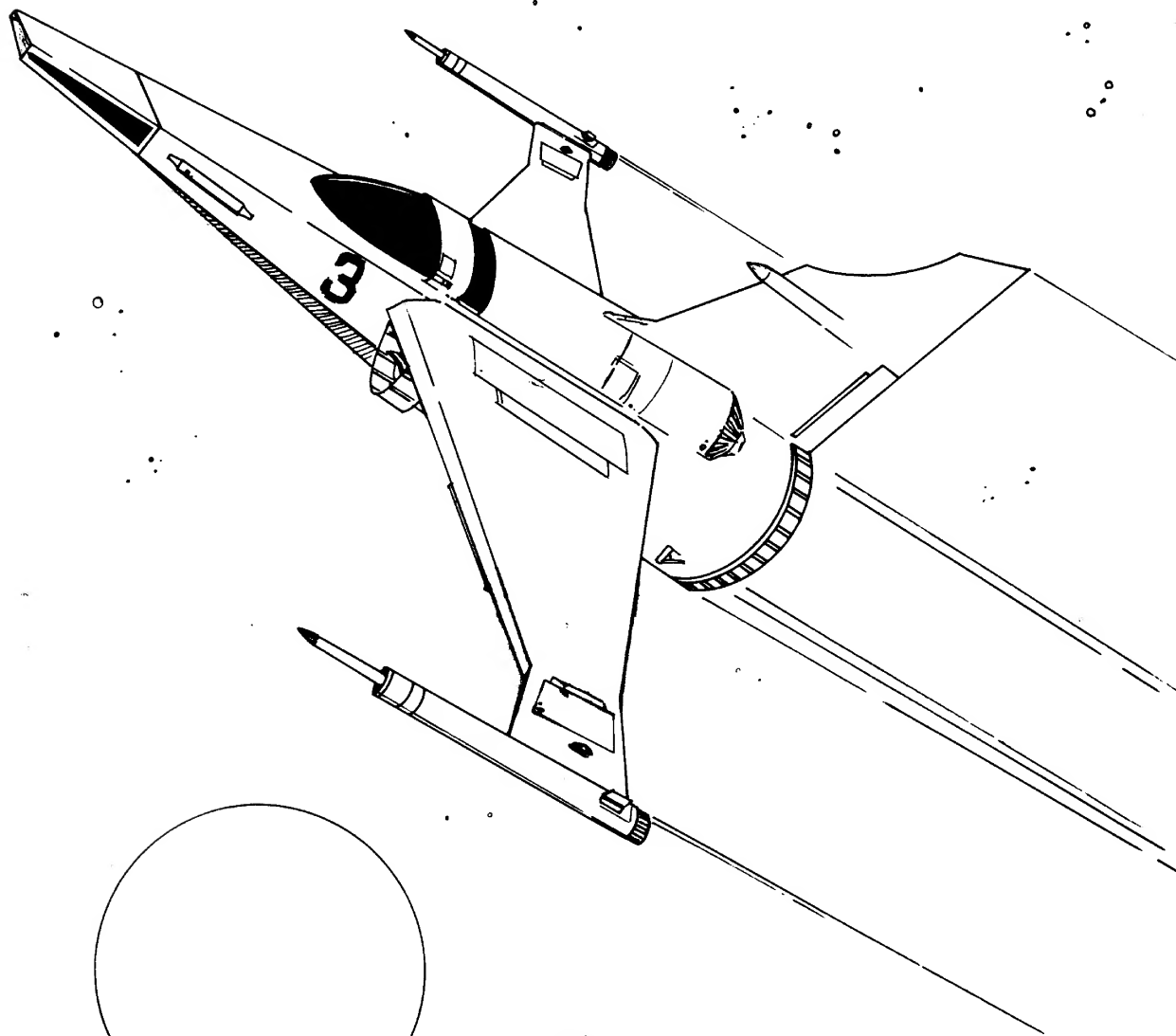


# **STAR FIRE<sup>TM</sup>**

## **OPERATOR'S MANUAL**



APRIL 1979



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## I. GENERAL DESCRIPTION

Exidy STARFIRE is a single player game which simulates combat between space-going fighters. The player can control the speed and direction of his fighter and attack enemy fighters with his lasers; the enemy fighters shoot fireballs at the player. The object of play is to accumulate points by destroying enemy fighters. A player can buy extra playtime during play and continue the game he is playing, as long as he has any time left; he earns bonus playtime each time he exceeds a bonus score. The game keeps track of 20 high scores — one score for each number of coins accumulated. The initials of high scoring players are displayed during the game's attract mode.

The operator selects coinage, time of play, number of plays at start, and score for bonus (if any). Six built-in self tests help the operator and service technician maintain and adjust the game, and diagnose circuit board problems.

## II. INSTALLATION AND MOVING (SEE FIGURE 2)

Exidy STARFIRE has two units:

- The video module (contains the monitor, player controls, and PC boards).
- The passenger module (contains the coin door and passenger seat).

Before installing the game, open the back door of the video module and visually check the PC boards and the monitor. Also check the wiring harness and make sure all the plugs are connected. To install the game, follow these steps:

- Step 1 — Move both modules to the installation site. Determine where the game will be placed and which direction it will face; put the video module in its location.
- Step 2 — The interconnect cable is taped to the platform at the bottom front of the video module. Carefully untape this cable and check it for breaks, bent pins, etc.
- Step 3 — Move the passenger module near the video module, and facing it. Push the interconnect cable through the hole at the bottom front of the passenger module. Open the coin door, reach inside, and connect the cable to the harness inside the passenger module.
- Step 4 — Power-up the game; the monitor should come on and the game should go into attract mode.

### NOTE

To get the game into attract mode, rather than one of the test modes, you may have to adjust the mode switch (switch 8 on the DIP switch); see Section IV, Operator Adjustments. Switch 8 **must** be OFF to play the game.

Step 5 — Remove the two U-brackets from the cash box (in the passenger module). Remove the pins from the hinges at the top of the video module. Hook the U-brackets into the slots at the bottom of the video module. The open end of each bracket must face up, and the bent lip must be on the outside (facing the passenger module). Pull the brackets as far toward you as they will go.

Step 6 — Push the passenger module almost up against the video module, lining up the slots at the bottom with the U-brackets. Take all the slack out of the interconnect cable, by pulling in the excess through the coin door. Now tilt the passenger module back on its rear feet, to raise the slots over the lips of the U-brackets. Push the passenger module forward, and lower its front end onto the U-brackets.

Step 7 — Adjust the four leveler feet on the bottom of the passenger module, to line up the hinges at the top of the passenger module with the hinges on the video module. When the hinges are in line, tap the hinge pins in place with a hammer.

STARFIRE is now assembled. Do not try to move the game as one unit; if the U-brackets slip out while moving, you may damage the hinges. Instead, we recommend you separate the two modules, move them separately, and reconnect them at the new location.

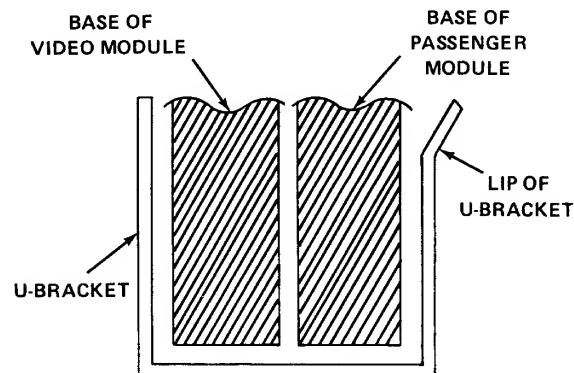


FIGURE 1. U-BRACKET PLACEMENT



1. VIDEO MODULE
2. HINGE
3. ILLUMINATED LOGO PANEL
4. PASSENGER MODULE
5. COIN DOOR
6. POSITION OF U-BRACKET
7. INTERCONNECT CABLE

FIGURE 2. CONNECTING THE MODULES

### III. NORMAL OPERATION

**A. Screen Display, Attract Mode.** — During attract, the screen cycles through a five-stage display:

- Stage 1 — The message:  
EXIDY EXCITEMENT  
Brings you . . .
- Stage 2 — The message:  
STARFIRE
- Stage 3 — The score table (see Figure 3).
- Stage 4 — The message:  
Deposit Coin
- Stage 5 — Enemy fighters moving on screen.

**B. Screen Display, Play Mode** — The screen shows a crosshair gunsight at the center of a background of stars; enemy ships move across this background. The background moves as the player works the controls, but the crosshairs always stay at the center of the screen.

The bottom of the screen has several indicators and a message panel. A thrust indicator shows the player's speed and forward-reverse direction, and a long range scan indicator shows the presence and direction of any enemy ships off the main screen. Other indicators show the player's current score and fuel level. The message panel tells whether the player has hit an enemy ship or been hit himself, whether his laser is ready to fire, etc.

Enemy fighters move in all directions on the screen, getting larger or smaller as they move toward or away from the player. Bonus Exidy pirate ships move from left to right across the screen, and always stay the same size. The fighters and pirate ships come in three colors: blue, green, and gold (actually orange). Blue fighters are worth 10 points, green fighters 20 points, and gold fighters 40 points; all bonus Exidy pirate ships are worth 50 points.

When a target (an enemy fighter or bonus Exidy pirate ship) comes near the crosshairs, two gauge scales appear — one from the right side and one from the bottom of



FIGURE 3. SCREEN DISPLAY, SCORE TABLE

the screen (see Figure 4). At the same time, a warning beep sounds. If the player maneuvers the target into the crosshairs, it is locked-on — the enemy is frozen in the crosshairs for several seconds, and the player can easily destroy it with his laser. When the player locks onto the enemy, a second warning beep sounds, a "LOCKED!" message appears on the message panel, and the target flashes in the crosshairs.

Press the laser fire button, and four simulated laser beams converge on the center crosshairs from the corners of the screen. If the lasers hit a target, it explodes. Enemy fighters can shoot fireballs at the player; if a fireball hits, the screen flashes and the player is penalized by being reset to blue targets.

**C. Screen Display, Test Modes** — See Section IV Operator Adjustments.

**D. Audio** — STARFIRE produces a wide variety of sound effects. An **ENGINE RUMBLE** sounds throughout the play, and an **EXPLOSION** sounds whenever an enemy explodes or the player is hit by enemy fire. There is a **LASER** sound whenever the player pushes the laser fire button, and a **HISS** whenever an enemy fighter fires at the player.

There are four different kinds of **WARNING BEEP**. These warn the player when he is almost locked onto a target, when he is actually locked on, when a target is just off the edge of the screen, and when the laser overheats.

These sounds are heard only during the play mode. There is only one operator adjustment for the sound effects — the volume control (see Section IV, Operator Adjustments).

**E. Player Controls** — STARFIRE has three player controls: a **steering yoke**, a **thrust control**, and a **laser fire button**. To steer right or left across the screen, turn the steering yoke like an automobile steering wheel; to move down or up, move the yoke in or out. Slide the thrust control T-handle up or down to move forward or back. The laser fire button is on the left handgrip of the steering yoke.

**F. Awards and Bonuses** — The operator can set the bonus score to 300, 500, or 700 points, or can turn off the bonus feature (see Section IV, Operator Adjustments). If the bonus has been set, a player has one chance of a bonus for each 300 fuel units he buys. If he tops the bonus score during any 300 unit period, the game awards him a bonus of 150 fuel units. This bonus fuel is added

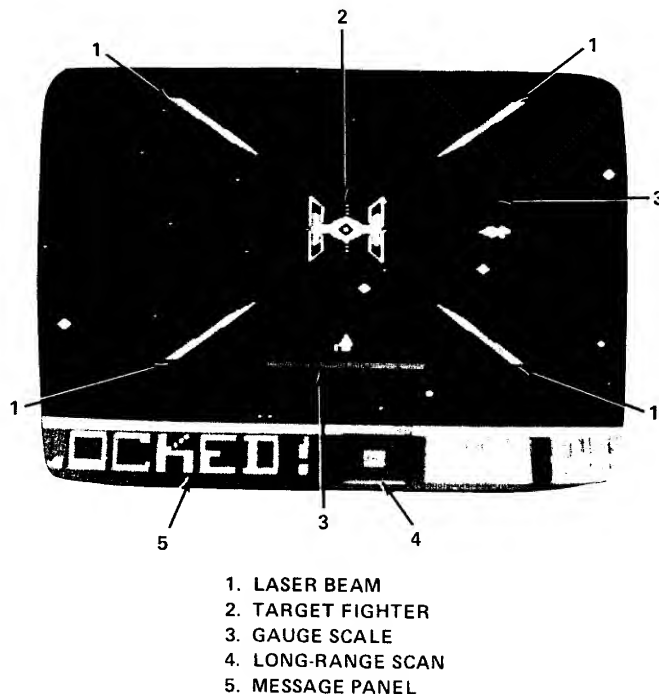


FIGURE 4. SCREEN DISPLAY, TARGET LOCK-ON

after the fuel indicator reaches zero. The player can only get one bonus for each 300 fuel units he buys.

The coin accumulator keeps track of the coins a player has spent. STARFIRE maintains twenty high scores: one for players who have only inserted one coin, a second for two-coin players, and so on. Players who spend more than twenty coins are lumped together in the twenty-coin score.

When a player finishes playing, STARFIRE counts the coins he has spent and compares his point score to the appropriate high score. If he has topped that score, the game asks him for his initials (one, two, or three letters); as long as his high score stands, his initials will be on the attract mode score table. If switch 7 of the DIP switch is ON, the score table will stay on screen as long as the laser fire button is pressed (see Section IV, Operator Adjustments).

Every third coin a player spends buys double playtime. That is, STARFIRE awards four coins worth of playtime for each three coins spent.

## IV. OPERATOR ADJUSTMENTS

### A. Selectable Options

The AUDIO VOLUME CONTROL is located at 8A on the daughter PC board (see Figure 10). All game options are selected by setting the 8-position DIP switch (located at 3A on the daughter PC board). The figure below shows which switches control which options.

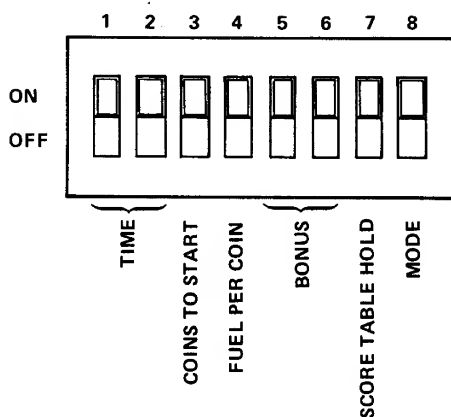


FIGURE 5. 8-POSITION DIP SWITCH

### Time of Play (for each 300 fuel units)

switch 1	switch 2	seconds
off	off	60
on	off	70
off	on	80
on	on	90

### Coins to Start & Fuel per Coin

switch 3	switch 4	coins to start	fuel units per coin
off	off	1	300
off	on	1	600
on	off	2	150
on	on	2	300

### Bonus

switch 5	switch 6	points needed for bonus
off	off	300
on	off	500
off	on	700
on	on	no bonus

### Score Table Hold (length of time score table is shown during attract mode)

switch 7	time
off	fixed length
on	fixed length, plus as long fire button is held



Mode	
switch 8	mode
off	play and attract
on	diagnostic tests

## B. Diagnostic tests

### Pre-Test

1. STARFIRE's game program is contained in integrated circuit devices ("chips") on the daughter PC board. Open the back door of the video module and check columns 1 and 2 of the daughter board, to see how many program chips there are (see Figure 9). There will be either ten or eleven chips.
2. If there are eleven chips, you must short resistor R3 to ground (see Figure 6). Use a test clip to do this; **do not cut the resistor's leads**. R3 is at location 2A on the mother PC board; short the side of R3 nearest column 3.
3. If there are only ten chips, do not short R3.
4. In either case, put switch 8 of the DIP switch to ON.

### First Test (Crosshatch)

1. The first test which comes on is a crosshatch pattern.
2. If the pattern is fuzzy or distorted, the color monitor needs alignment, convergence, or focus adjustment. These adjustments should be done by a service technician.

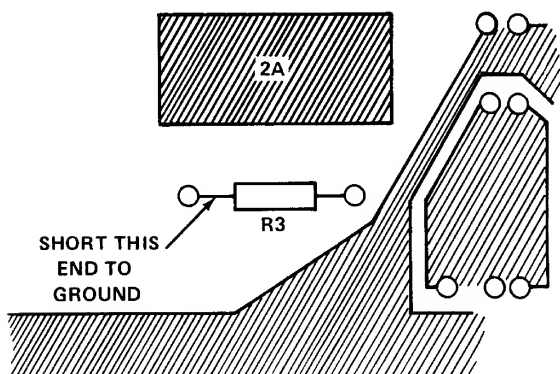


FIGURE 6. SHORTING RESISTOR R3

3. When finished with this test, press the laser fire button, and the second test will come on.

### Second Test (Color Bar)

1. The second test is a color bar pattern. There are eight levels each of red, blue, green, and grey, counting the vertical black bars as the first level of each color. (The paper bezel may hide the rightmost bars of the grey display; if so, just use the ones you can see.)
2. If you can't see eight distinct levels (including black) of red, blue, and green, or if the colors are smeared, then the monitor needs color adjustment. This should be done by a service technician.
3. When finished with this test, press the laser fire button, and the third test will come on.

### Third Test (Control Setup)

1. Service technicians use this test to adjust the player controls. (See Section VI, Technical Information.)
2. Three short horizontal bars move up and down the screen to show the **current** position of the throttle, vertical and horizontal player controls (see Figure 13).
3. Three horizontal lines across the screen show the maximum, minimum, and center positions for the controls (see Figure 13).
4. When finished with this test, press the laser fire button, and the fourth test will come on.

### Fourth Test (Program Memory)

1. This test does an evaluation of each program chip. It will tell you which devices may need replacing.
2. The screen shows a board map of the program. Good devices are shown in green, bad devices in red.
3. When you have finished this test, press the laser fire button, and the fifth test will come on.

### Fifth Test (Color Memory)

1. When this test comes on, the screen will go blank. It will stay blank for two or three minutes while the game's color memory is automatically tested. When the test is complete, a board map will appear on the screen. Good memory chips are shown in green, and bad ones in red.
2. When you have finished this test, press the laser fire button, and the sixth test will come on.

#### Sixth Test (Main RAM)

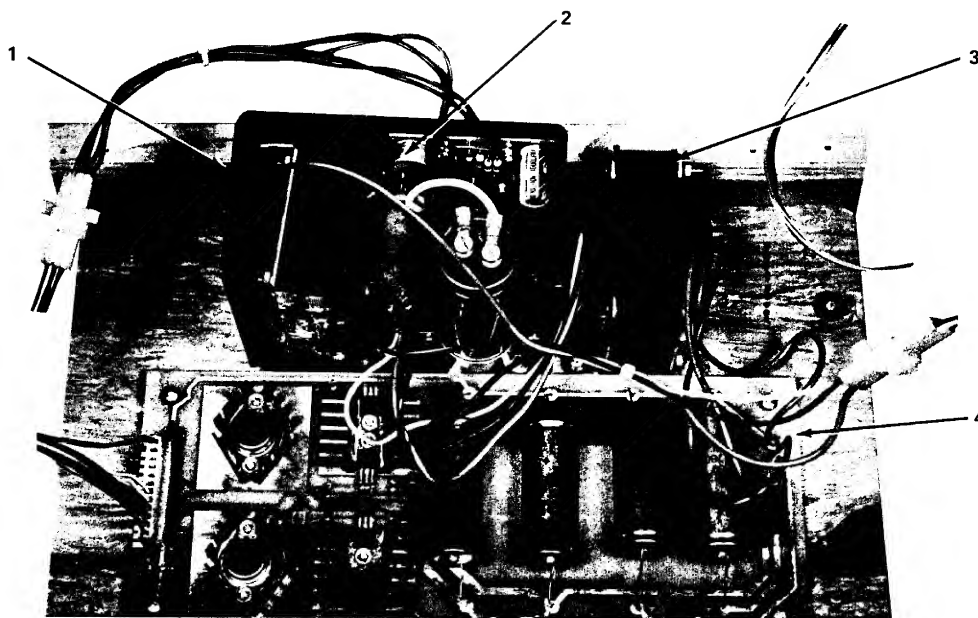
1. There are two versions of this test: the normal version (which tests 7/8 of the RAM) and a full version (which tests all the RAM).
2. The game will automatically do the normal version of this test; in order to do the full version, you must make a hardware modification. The full version is rarely necessary; if the game passes the normal version of this test, you know that 7/8 of the RAM is good, and you have a good assurance that the remaining 1/8 is also good.
3. To do the full version, refer to Section VI, Technical Information. The full version should only be done by a qualified service technician.
4. When either version of this test begins, the screen will show a changing pattern while the chips are tested; the screen may then go blank for a while. Finally, a PC board map will appear on the screen, showing the good RAMs in green, and the bad RAMs in red. The test takes several minutes to complete.

The self-test is now finished; you may repeat the tests by pressing the laser fire button. When you have finished testing, reset switch 8 to OFF. Be sure to re-enable resistor R3 if it was shorted to ground.

#### C. Power Supply Adjustment

The power supply is at the bottom rear of the video module, accessible through the back door (see Figure 8).

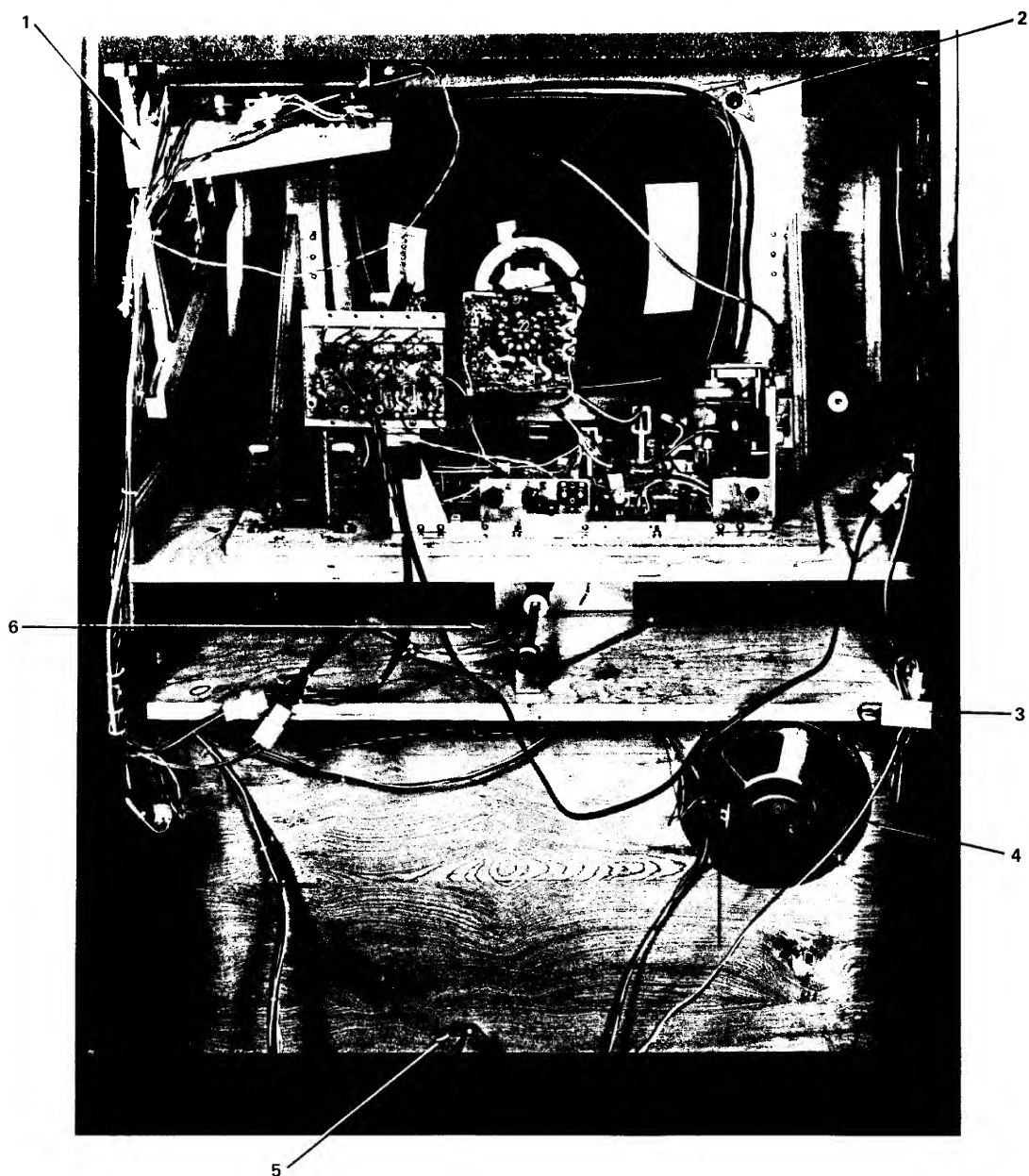
1. Unplug the power cord.
2. Open the back door of the video module. (If you have to move the game to get to the back door, you should first separate the two modules, as described in Section II, Installation and Moving.)
3. Pull the PC board mount part way out of its slot (see Section V, Mechanical Disassembly).
4. Plug the power cord back in, and power-up the game.
5. Locate the  $\pm 5$  V and ground pins on the 10-pin connector of the daughter board (see Figure 9). These are the center two pins — counting from the column 5 side of the connector (the side nearest the rear of the cabinet), the fifth pin is ground, and the sixth pin is  $\pm 5$  V.
6. Adjust the power supply potentiometer (see Figure 7) for  $\pm 5 \pm .1$  VDC.



1. 5 VOLT 6 AMP UNIT  
2. ADJUSTMENT POTENTIOMETER

3. TRANSFORMER  
4. PC BOARD ASSEMBLY

FIGURE 7. POWER SUPPLY



1. PC BOARDS (IN MOUNT)  
2. COLOR MONITOR  
3. INTERLOCK SWITCH

4. SPEAKER  
5. POWER SUPPLY  
6. CONTROL UNIT

FIGURE 8. REAR OF VIDEO MODULE, BACK DOOR OPEN



### B. To Remove the Player Control Unit

1. Unplug the power cord.
2. Separate the two modules (see Section II, Installation and Moving).
3. Open the back door of the video module.
4. Disconnect the two harness connectors from the player controls.
5. From inside the video module, remove the four nuts from the carriage bolts which hold the control unit plywood shelf to the cabinet shelf.
6. From the front of the video module, slide the control unit out. Be careful not to damage the vinyl cabinet walls.

PC board mount in this position. Do not remove the harness connectors.

6. If you wish to remove the PC boards for service or test, first remove all the harness connectors from the two boards, then slide the board mount all the way out of the cabinet.
7. When replacing the PC boards, be sure to plug the harness connectors onto the correct connectors on the PC boards (see Figure 9).

#### NOTE

The locking ramp of each connector must face the board. Be careful not to offset the connector to one side (see Figure 10) — this may damage the PC boards.

### C. To Remove the PC Boards

1. Unplug the power cord.
2. Open the back door of the video module (see NOTE above).
3. Remove the two 5/8" wood screws that hold the PC board mount to the cabinet. These screws are at the upper and lower left.
4. Slide the PC board mount *part* way out.
5. If you only wish to adjust the DIP switch or short resistor R3 for diagnostic tests, do so with the

### D. To Remove the Power Supply

1. Unplug the power cord.
2. Open the back door of the video module (see NOTE above).
3. Disconnect the two harness connectors to the power supply.
4. Remove the four wood screws holding the power supply to the floor of the cabinet.
5. Lift the power supply up and out of the cabinet.

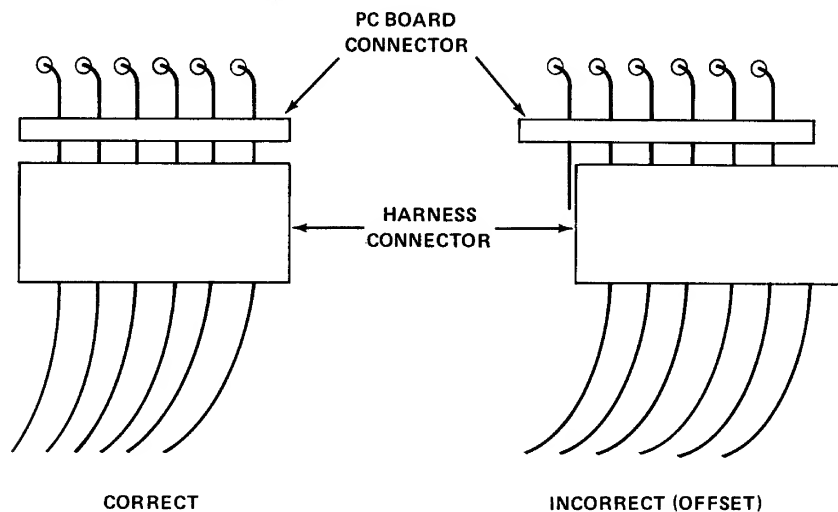


FIGURE 10. HARNESS CONNECTOR OFFSET

### E. To Remove the Logo Panel Lamp

1. Unplug the power cord.
2. Separate the two modules (see Section II, Installation and Moving).
3. From the front of the video module, remove the illuminated logo plastic panel by pushing up and lifting toward you.
4. The logo panel is illuminated by two 15 W soft-white bulbs or by a single LUMILINE lamp (which looks like a florescent lamp).
5. If your unit has two 15 W bulbs, unscrew them in the normal manner.
6. If your unit has a LUMILINE lamp, lift the lamp vertically. The end caps will pop free of the mountings, and you can then remove them from the ends of the lamp.

## VI. TECHNICAL INFORMATION

### A. Player Controls, Mechanical Description (see Figure 12)

The STARFIRE control unit has two parts:

- The **steering assembly** (controls up-down and side-side motion)
- The **thrust control assembly** (controls speed and forward-reverse)

The steering assembly has two control potentiometers ("Pots"): the pitch (up-down) control pot, and the yaw (side-side) control pot. The player works the steering assembly by moving the steering yoke.

The steering yoke is fixed to the steering tube; two large return springs are attached to the ends of a turn stop, which is bolted to this tube. Whenever the yoke is moved from its neutral (rest) position, these springs pull it back into place.

There are two collars on the steering tube, mounted with shock absorbing rubber bushings. These collars limit the tube's in-and-out movement. A tension spring keeps the pitch link in contact with the lower collar. The pitch link moves in and out when the steering yoke is moved in or out. The pitch control pot is fixed to the pitch link, and steers the screen display down or up when the steering yoke is moved out or in.

At the end of the steering tube is a white nylon square collar bushing, which fits over one end of the square shaft. This bushing slips up and down the square shaft as the yoke is moved in and out. The yaw control pot is fixed to the other end of the square shaft, and steers the screen display left or right when the steering yoke is turned.

The thrust control assembly contains the thrust control potentiometer. The player works this control by moving the T-handle thrust control lever.

The thrust control lever has a stud at its inside end. The thrust pivot engages this stud so that the pivot rotates when the thrust lever is moved. The thrust control pot is fixed to this pivot, and adjusts the game's speed and direction when the thrust lever is moved.

The laser fire button is a simple pushbutton on the left handgrip of the steering yoke.

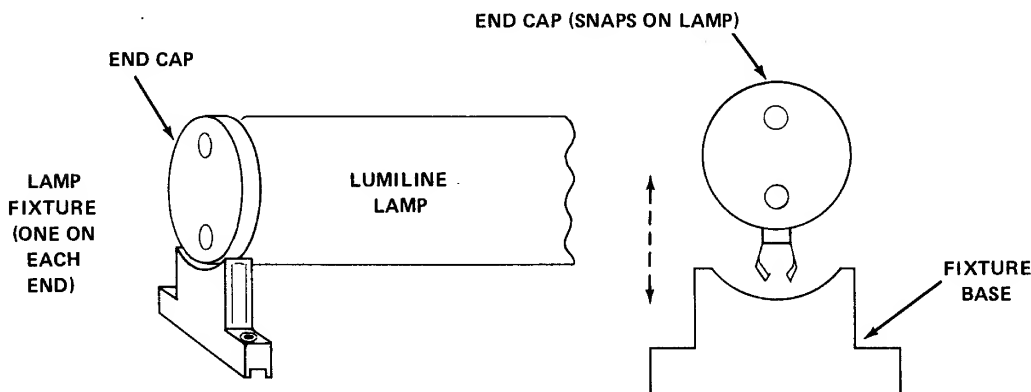
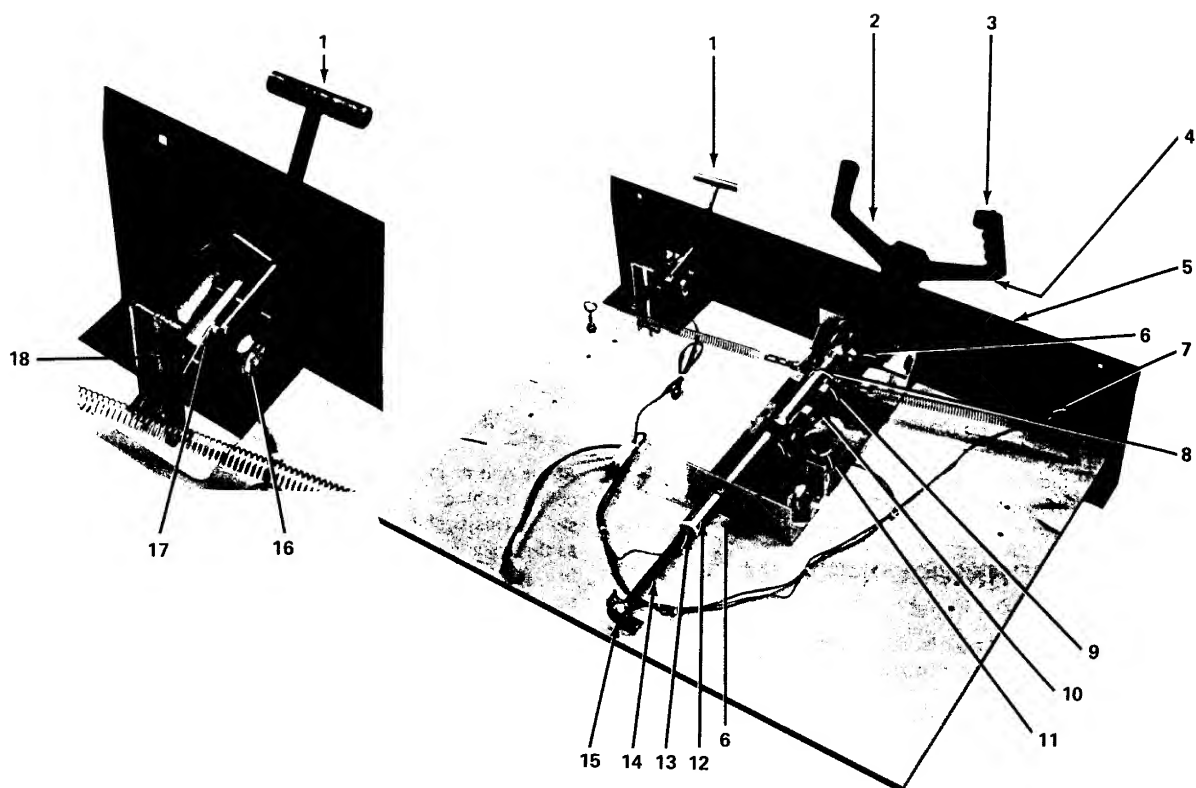


FIGURE 11. LUMILINE LAMP FIXTURES



1. T-HANDLE
2. STEERING YOKE
3. LASER FIRE BUTTON
4. YOKE COVER PLATE
5. PRINTED CONTROL PANEL
6. COLLAR
7. GAME START BUTTON
8. STAINLESS STEEL BOLT
9. STEERING STOP

10. PITCH LINK
11. PITCH POTENTIOMETER (VERTICAL)
12. STEERING TUBE
13. SQUARE SHAFT BUSHING
14. SQUARE SHAFT
15. YAW POTENTIOMETER (HORIZONTAL)
16. THRUST POTENTIOMETER
17. THRUST PIVOT
18. THRUST RAIL

FIGURE 12. CONTROL UNIT

## B. Player Controls, Adjustment

1. Unplug the power cord, and separate the two modules (see Section II, Installation and Moving). Open the rear door of the video module.
2. From inside the video module, remove the four nuts holding the player control unit. Remove the two 5/8" wood screws that hold the PC board mount to the cabinet; these screws are at the upper and lower left.
3. Pull the PC board mount part way out of its slot.
4. Check the daughter board to see whether it has ten or eleven program chips; short R3 to ground

if necessary (see Section IV, Operator Adjustments). Set switch 8 of the DIP switch to ON.

5. From the front of the video module, slide the control unit about halfway out.
6. Plug in the power cord and power-up the game. The first diagnostic test (crosshatch pattern) will appear on screen. Press the laser fire button **twice**, to bring on the third diagnostic test (control setup — see Section IV, Operator Adjustments).
7. From the front of the video module, adjust the pitch potentiometer (vertical control) — see Figure 12.

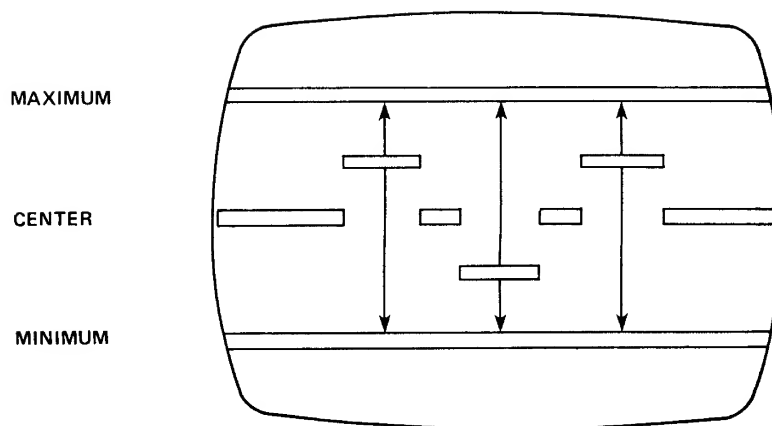


FIGURE 13. SCREEN DISPLAY, CONTROL SETUP TEST

- a. Loosen the setscrew that holds the pitch link to the pot.
  - b. With your fingers or a small pliers, turn the shaft of the pot so that the blue bar goes to the top of the screen. Continue turning the pot as far as it will go; then turn it in the other direction until the blue bar fills the gap in the center horizontal line on screen.
  - c. Let the springs pull the steering tube to its neutral (rest) position. The pot will not turn while the tube moves.
  - d. Retighten the setscrew.
  - e. Move the steering yoke in and out. The blue bar should not overshoot the top or bottom horizontal lines; if it does, replace C6 with a 2200 pf  $\pm$  5% capacitor. (C6 is on the daughter board, between locations 5A and 6A).
  - f. When the pitch pot is correctly adjusted, fix the setscrew in place with a drop of medium strength adhesive/sealant.
8. From the front of the video module, adjust the thrust control potentiometer — see Figure 12.
    - a. Loosen the setscrew that holds the thrust pivot to the pot.
    - b. With your fingers or a small pliers, turn the shaft of the pot so that the green bar goes to the top of the screen. Continue turning the pot as far as it will go; then turn it in the other direction until the green bar fills the gap in the center horizontal line on screen.
    - c. Move the T-handle to its center position; the pot will not turn while the handle moves.
    - d. Retighten the setscrew.
    - e. Move the T-handle up and down. The green bar should not overshoot the top or bottom horizontal lines; if it does, replace C5 with a 2200 pf  $\pm$  5% capacitor. (C5 is on the daughter board, between locations 4A and 5A.)
    - f. When the thrust pot is correctly adjusted, fix the setscrew in place with a drop of medium strength adhesive/sealant.
  9. Push the control unit back into the video module. From the back of the module, adjust the yaw potentiometer (horizontal control) — see Figure 12.

#### NOTE

You will need a large mirror or an assistant, since you cannot directly see the screen display from the rear of the module.

- a. Loosen the two setscrews at the end of the square shaft; pull the shaft off the pot.
- b. Turn the shaft of the pot with your fingers so the red bar goes to the top of the screen. Continue turning the pot as far as it will go;



- then turn it in the other direction until the red bar fills the gap in the center horizontal line on screen.
- Let the springs pull the steering tube to its neutral (rest) position; then reconnect the square shaft to the pot.
  - Tighten the two setscrews.
  - Move the steering yoke right and left. The red bar should not overshoot the top or bottom horizontal lines; if it does, replace C8 with a 2200 pf  $\pm$  5% capacitor. (C8 is on the daughter board, between locations 4B and 5B.)

### C. Color Monitor Adjustment, General

Each STARFIRE game has one of two different color monitors:

- PHOTOTEK
- TEKNIKA (WELLS-GARDNER)

Check the game to see which monitor is installed. The PHOTOTEK monitor has an open wooden chassis; the TEKNIKA monitor has a steel cabinet with a plastic back panel.

When the game is in test mode (switch 8 ON), the first two diagnostic tests are a crosshatch pattern and a color bar pattern, for adjusting the monitor (see Section IV, Operator Adjustments). All adjustments to the monitor should be made by a service technician.

#### NOTE

Use the following two procedures to adjust STARFIRE color monitors. The adjustments are made from the back of the video module, **without** removing the monitor. You must have a large mirror or an assistant, since you cannot directly see the screen display while adjusting the monitor.

A quick check of the attraction display will show whether the monitor needs color adjustment. The background should be pure black; all stars (except those close to a colored object or letter) should be pure white, with no trace of red, blue, or green; enemy ships should be pure blue, green, or gold (orange).

### D. Color Monitor Adjustment, PHOTOTEK

- Unplug the power cord.
- Open the back door of the video module. (If you have to move the game to get to the back door, you should first separate the two modules, as described in Section II, Installation and Moving.)

- Pull the PC board mount part way out of its slot (see Section V, Mechanical Disassembly).
- Check the daughter board to see whether it contains ten or eleven program chips; short R3 to ground if necessary (see Section IV, Operator Adjustments). Set switch 8 of the DIP switch to ON.
- Place a large mirror so that you can see the screen display from the back of the video module, or else have an assistant watch the display and describe it to you as you adjust the monitor.
- Plug in the power cord and power-up the game; let the monitor warm up for 15 minutes. The first diagnostic test (crosshatch pattern) will appear on screen. Adjust the focus, brightness, brightness limit, and height controls against this pattern (see Figure 14 for control locations). If the monitor needs convergence or linearity adjustment, consult the manufacturer (ALGOL CORP., 303 Convention Way, Redwood City, CA 94063) or contact Exidy Customer Service, 390 Java Drive, Sunnyvale, CA 94086.

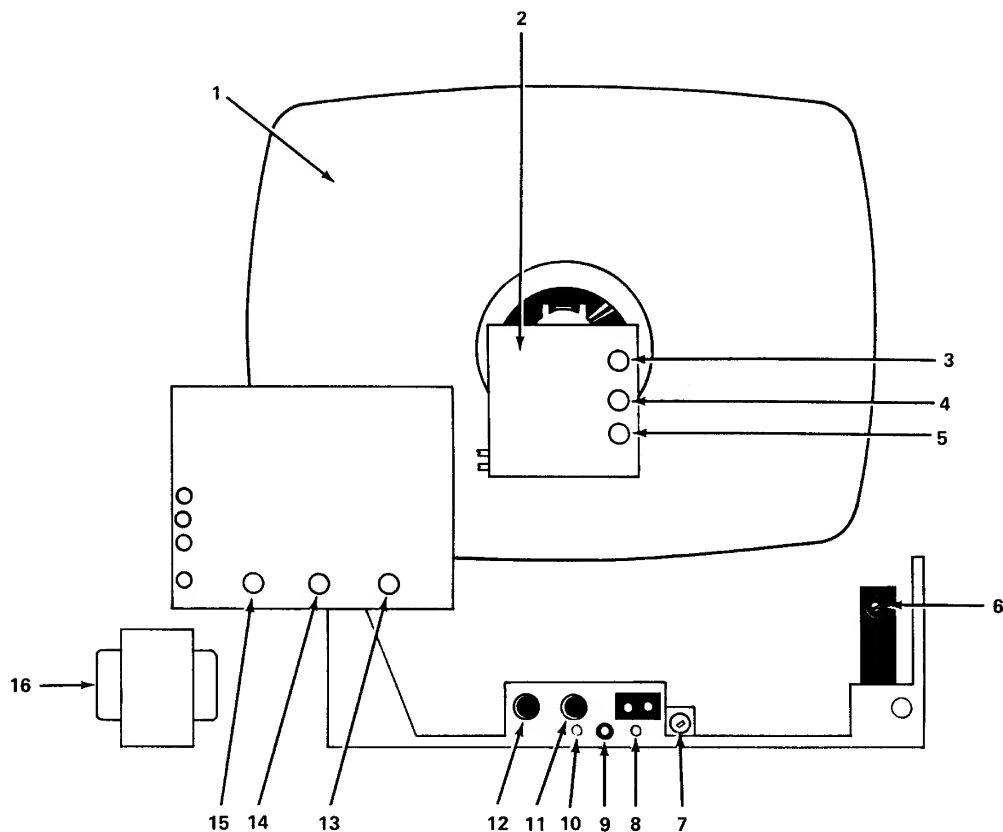
#### CAUTION

Always wear safety glasses when working near an exposed video picture tube.

- Press the laser fire button to bring on the second diagnostic test (color bar pattern).
  - Turn up each color balance control in turn, until you see that color as the background of the test pattern; then back off the control slightly, to get a black background. Adjust only one color at a time.
  - If necessary, adjust the color biases to bring up the color intensities. Adjust only one color at a time.
  - If the colors of the test pattern smear or blend, then the color balance or color bias controls are set too high; back them off.
- When you finish the adjustments, put the game into the attract mode (switch 8 OFF, and resistor R3 enabled). Check the colors of the attraction display (see above, Color Monitor Adjustment, General, for description).

### E. Color Monitor Adjustment, TEKNIKA (Wells-Gardner)

- Unplug the power cord.
- Open the back door of the video module. (If you have to move the game to get to the back door,



- |                     |                  |
|---------------------|------------------|
| 1. PICTURE TUBE     | 9. VERTICAL HOLD |
| 2. NECK BOARD       | 10. HEIGHT       |
| 3. BLUE BALANCE     | 11. BRIGHTNESS   |
| 4. GREEN BALANCE    | 12. ON/OFF       |
| 5. RED BALANCE      | 13. RED BIAS     |
| 6. FOCUS            | 14. GREEN BIAS   |
| 7. HORIZONTAL HOLD  | 15. BLUE BIAS    |
| 8. BRIGHTNESS LIMIT | 16. TRANSFORMER  |

FIGURE 14. PHOTOTEK MONITOR, ADJUSTMENTS

you should first separate the two modules, as described in Section II, Installation and Moving).

3. Pull the PC board mount part way out of its slot (see Section V, Mechanical Disassembly).
4. Check the daughter board to see whether it contains ten or eleven program chips; short R3 to ground if necessary (see Section IV, Operator Adjustments). Set switch 8 of the DIP switch to ON.
5. Disconnect the 12-pin harness connector from the monitor. Remove the four screws holding the back cover of the monitor, and remove the back cover. Reconnect the harness connector.

#### CAUTION

Always wear safety glasses when working near an exposed video picture tube.

6. Place a large mirror so that you can see the screen display from the back of the video module, or else have an assistant watch the display and describe it to you as you adjust the monitor.
7. Plug in the power cord and power-up the game; let the monitor warm up for 15 minutes. The first

diagnostic test (crosshatch pattern) will appear on screen. Adjust the focus and vertical size controls against this pattern (see Figure 15 for control locations). If the monitor needs convergence or linearity adjustment, consult the manufacturer (TEKNIKA ELECTRONICS CORP., Service Center, Gothic Plaza 333 RTE 46, Fairfield NJ 07006 — Phone (201) 575-0380, (800) 221-2106), or contact Exidy Customer Service, 390 Java Drive, Sunnyvale CA 94086.

8. Press the laser fire button to bring on the second diagnostic test (color bar pattern).
  - a. Adjust the interface pot if necessary, until there is one black stripe between each primary color.
  - b. If retrace lines appear on the screen, turn the interface pot back slightly.
  - c. Adjust the pot until the screen shows eight steps each of red, green, blue, and grey (counting the vertical black stripes as the first step of each color). The bezel may hide the last two steps of the grey display; if so, just use the ones you can see.

- d. If the color is weak, or if you can't get eight distinct steps of each color, adjust the color cutoff pots on the neck board (see Figure 15).
- e. As a last resort, adjust the screen drive pot on the neck board (see Figure 15). Use this pot together with the interface pot — when you turn one of them up, you must turn the other down. Note that the screen drive control effects the entire color alignment; if you adjust this control, you will have to begin the color adjustment over again.

9. When you finish the adjustments, put the game into the attract mode (switch 8 OFF, and resistor R3 enabled). Check the colors of the attraction display (see above, Color Monitor Adjustment, General). If the colors are correct, put some sealing varnish or RTV glue on the interface pot, to hold it in place.
10. Replace the cover of the monitor (reverse of step 5 above), and secure it with its four screws.

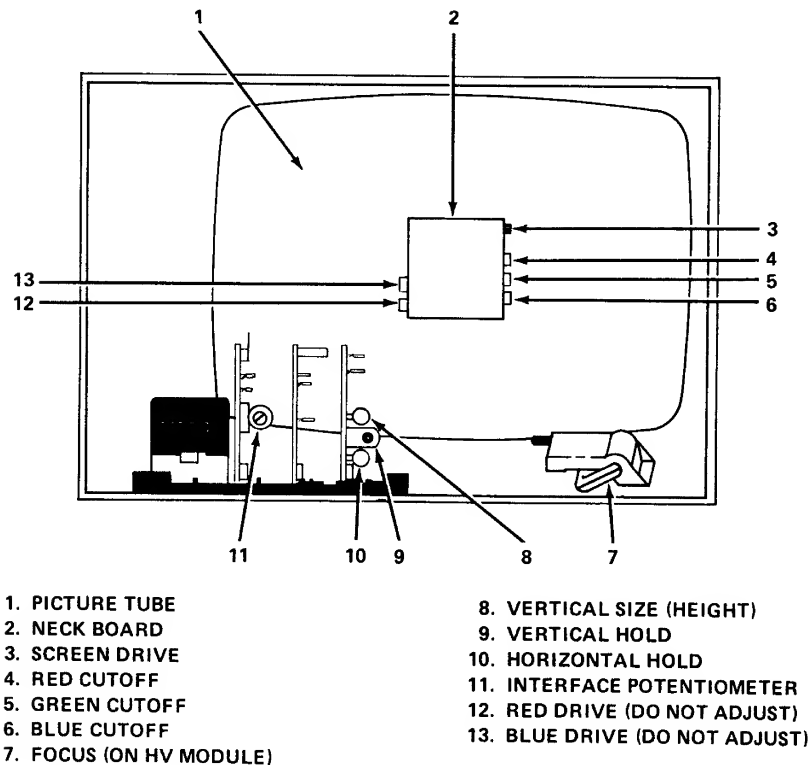


FIGURE 15. TEKNIKA MONITOR, ADJUSTMENTS

## F. Main RAM Test, Full Version

### NOTE

The full version of the main RAM test should be done by a service technician.

With the game in test mode (switch 8 ON), the sixth diagnostic test will normally check 7/8 of the game's main RAM (all but the scratchpad RAM). If you suspect the RAM is malfunctioning, but the normal test does not show anything wrong, you should consider the full ver-

sion of the test, which tests **all** the RAM, including the scratchpad. To do the full version, you must first disable the Non-Maskable Interrupt (NMI) signal to the CPU; do this when the game is in test mode, since it cannot enter test mode without the NMI signal.

To disable the NMI, open jumper J6 on the mother board (at location 4G, just below the CPU). We recommend you replace J6 with a switch or test clip before starting the tests. Once in test mode, open the switch or remove the test clip; then bring on the sixth diagnostic test (main RAM) by pressing the laser fire button five times. Be sure to re-enable the NMI when you finish the test.

## G. Troubleshooting Table

Notes on the troubleshooting table

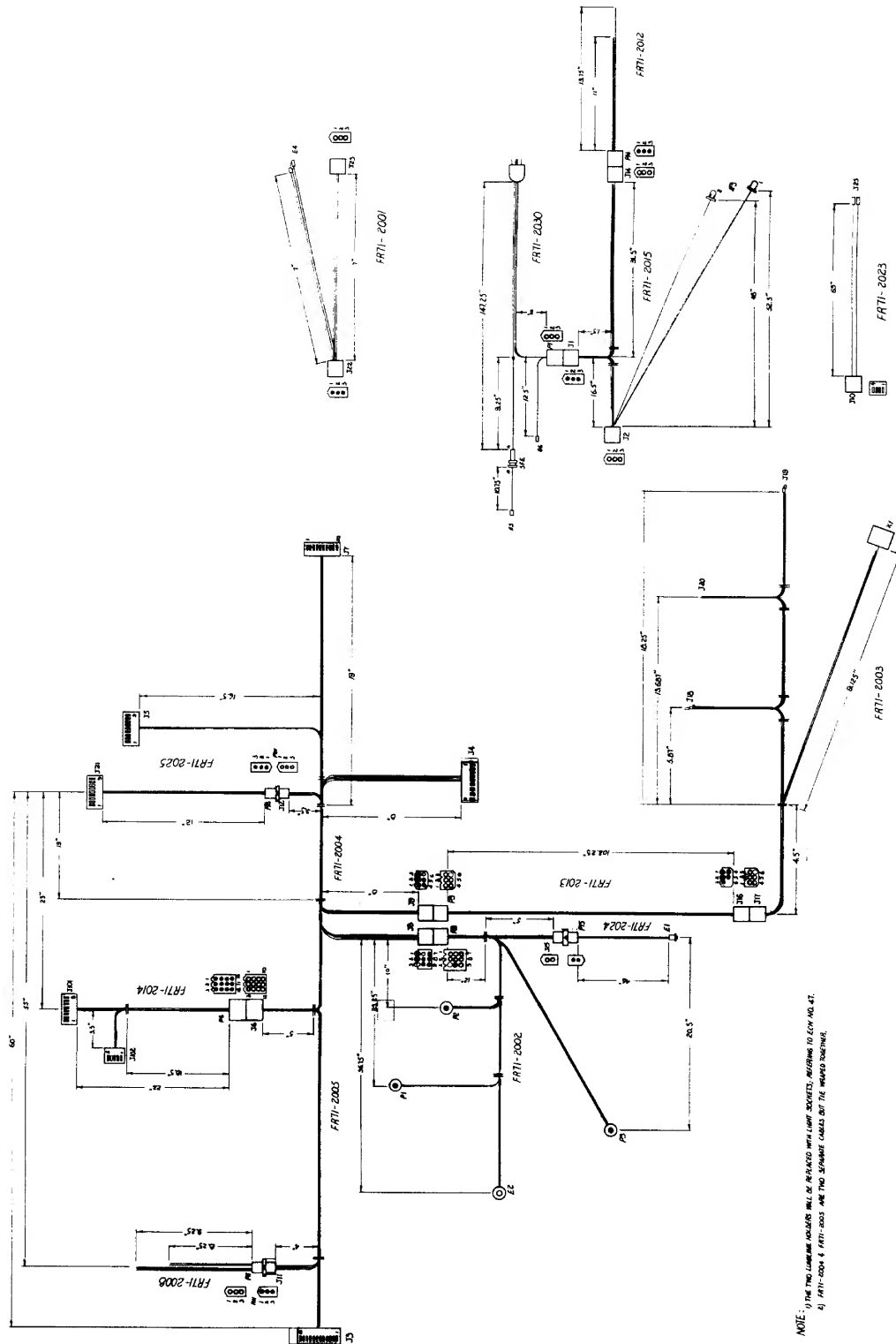
1. The game program is contained in ten or eleven integrated circuit devices ("chips") located in columns 1 and 2 of the daughter PC board (see Figure 9). Use diagnostic test 4 to check these chips.
2. The quickest way to check some parts of the game is to **swap** them with a working unit. (If no other unit is available, you will have to check the part by tracing through its schematics.)

Example: If you suspect the daughter PC board is malfunctioning, remove and replace it with a daughter board taken from a working STARFIRE. If that cures the trouble, then the first daughter board needs repair.

SYMPTOM	POSSIBLE CAUSE	SERVICE
Game does not turn on	No power to game	Check fuse  Check interlock switch  Check connectors of audio power harness  Check line voltage
Color monitor on, but no picture	Loose monitor harness  Bad power supply  Bad monitor  Bad PC boards	Check harness connectors  Check power supply voltage  Check/swap monitor  Check/swap both PC boards
Audio good, but no video	Loose monitor harness  Bad monitor  Bad PC boards	Check harness connectors  Check/swap monitor  Check/swap both PC boards
Video good, but no audio	Loose audio power harness  Loose speaker harness  Bad speaker  Bad PC audio circuits	Check harness connectors   Check speaker  Check/swap daughter PC board

### G. Troubleshooting Table (Continued)

SYMPTOM	POSSIBLE CAUSE	SERVICE
Video good, but no game	Wrong mode	Check position of switch 8, DIP switch
	Bad program chips	Check chips (diagnostic test 4)
	Bad daughter board	Check/swap daughter board
Game plays, audio good, but video distorted	Monitor out of adjustment	Check/adjust monitor (diagnostic tests 1 and 2)
	Bad program chips	Check chips (diagnostic test 4)
	Bad PC boards	Check/swap both PC boards
Game plays, but no laser	Loose control harness	Check harness connectors
	Laser fire button	Check button
	Bad program chips	Check chips (diagnostic test 4)
	Bad daughter board	Check/swap daughter board
Will not accept coin	Loose coin door/counter harness	Check all harness connectors inside passenger module
	Loose interconnect cable	Check cable connection between the modules
	Bad coin mechanism	Check/swap coin mechanism
Game plays, but bad motion control: up-down OR side-side OR speed	Loose control unit harness	Check harness connectors
	Control unit, mechanical	Check: pitch link OR square shaft OR thrust pivot
	Control unit, electrical	Check/adjust: pitch pot (vertical) OR yaw pot (horizontal) OR thrust pot (speed)
Logo plastic panel won't light	Bad daughter board	Check/swap daughter board
	Loose power and light harness	Check harness connectors
	Lamp burned out	Replace lamp



## H. Wiring Harness Diagram

# I. Wiring Harness Pinout Table

Harness	Connector	From	To	Wire	Signal
Power Supply AC input	J1 (3-pin male Molex)	J1-1	J2-1	18" black 18 ga	Hot
		J1-1	J14-1	33" black 18 ga	
		J1-2	J2-2	18" white 18 ga	Ground
		J1-2	J14-2	33" white 18 ga	
		J1-3	J2-3	18" green 22 ga	Earth ground
		J1-3	J14-3	33" green 22 ga	
Light Harness AC input	J2 (3-pin female Molex)	J2-1	E3-1	51" black 18 ga	Hot
		J2-2	E3-2	39" white 18 ga	Ground
Main Harness Power Supply Output	J3 (12-pin male Molex)	J3-1	J6-12	40" black 18 ga	Ground
		J3-2	J12-2	63½" yel-org 18 ga	+12 VDC audio
		J3-2	J12-3	63½" yel-org 18 ga	
		J3-3	J4-1	68" yellow 18 ga	+12 VDC logic
		J3-3	J6-11	40" yellow 18 ga	
		J3-4	J6-10	40" brown 18 ga	-5 VDC
		J3-4	J4-5	68" brown 18 ga	
		J3-5	J12-1	63½" white 18 ga	-VDC audio
		J3-6	J4-4	68" wht-red 18 ga	-12 VDC logic
		J3-7 to J3-11	UNUSED		
		J3-12	J4-7	68" black 18 ga	Ground
		J3-12	J11-3	9" black 18 ga	
Main Harness Mother Board Power	J4 (9-pin female Molex)	J4-2	J11-3	67" red 18 ga	+5 VDC
		J4-3	J11-3	67" black 18 ga	Ground
		J4-6 and J4-9	UNUSED		
		J4-8	J11-2	67" red 18 ga	+5 VDC

# I. Wiring Harness Pinout Table (Continued)

Harness	Connector	From	To	Wire	Signal
Main Harness Mother board Video	J5 (9-pin female Molex)	J5-1	J6-7	46½" 22 ga } yel twisted pair } blk	Composite sync
		J5-6	J6-8		Ground
		J5-7	J6-1	46½" 22 ga } red twisted pair } blk	Red video
		J5-4	J6-2		Ground
		J5-8	J6-5	46½" 22 ga } blu twisted pair } blk	Blue video
		J5-4	J6-6		Ground
Main Harness Monitor	J6 (12-pin female Molex)	J5-9	J6-3	46½" 22 ga } grn twisted pair } blk	Green video
		J5-6	J6-4		Ground
Main Harness Daughter Board Direction	J7 (10-pin flat female Molex)	J6-9	J11-1	39" red 18 ga	+5 VDC
		J7-1	J9-5	46" green 22 ga	Anti-slam switch
		J7-2	J8-9	46" lt. blue 22 ga	Pitch (vertical)
		J7-3	J8-8	46" violet 22 ga	Yaw (horizontal)
		J7-4	J8-7	46" grn-red 22 ga	Forward-reverse/thrust
		J7-5	J8-6	46" black 22 ga	} Ground
		J7-5	J9-2	46" black 22 ga	
		J7-6	J8-5	46" red 22 ga	} +5 VDC
		J7-6	J9-1	46" red 22 ga	
		J7-7	J9-4	46" wht-blk 22 ga	Coin (norm. open)
		J7-8	J9-3	46" yel-blk 22 ga	Coin (norm. closed)
Main Harness Control Unit	J8 (9-pin male Molex)	J7-9	J8-2	46" blue 22 ga	Start
		J7-10	J8-1	46" orange 22 ga	Fire
Main Harness Coin Mechanism	J9 (6-pin male Molex)	See J7			
Main Harness Daughter Board—Speaker	J10 (4-pin female Molex)	J10-2 J10-3	Spade Connectors	63" 22 ga } vlt twisted pair } wt-gn	Speaker Speaker



# **I. Wiring Harness Pinout Table (Continued)**

Harness	Connector	From	To	Wire	Signal
Control Unit Harness	P8 (9-pin female Molex)	P8-1	J15-1	17" orange 22 ga	Fire
		P8-2	E2-C	48 <sup>3</sup> / <sub>4</sub> " blue 22 ga	Start
		P8-3 } and P8-4 }	UNUSED		
		P8-9	P1-R	44 <sup>3</sup> / <sub>4</sub> " lt. blue 22 ga	Pitch (vertical)
		P8-5	P3-R	32 <sup>1</sup> / <sub>2</sub> " red 22 ga	+5 VDC
		P8-6	J15-2	17" black 22 ga	Ground
		P8-7	P3-M	32 <sup>1</sup> / <sub>2</sub> " grn-red 22 ga	Forward-reverse/thrust
		P8-8	P2-R	27" violet 22 ga	Yaw (horizontal)
Control Unit Fire Button	J15 (2-pin female Molex)	J15-2	E2-A	41 <sup>3</sup> / <sub>4</sub> " black 22 ga	Ground
Control Unit Start Button	E2 (903 switch)	See P8			
Control Unit Pitch Pot (vertical)	P1 (50K potentiometer)	P1-M	P2-M	27 <sup>3</sup> / <sub>4</sub> " red 22 ga	+5 VDC
Control Unit Yaw Pot (horizontal)	P2 (50K potentiometer)	P2-M	P3-R	35 <sup>1</sup> / <sub>2</sub> " red 22 ga	+5 VDC
Control Unit Thrust Pot (speed)	P3 (50K potentiometer)	See P8			
Main harness +5 Power Supply	J11 (3-pin male Molex)	See J4, J6			
Main Harness Audio Power	J12 (3-pin female Molex)	See J3			
AC Power and Light Harness Xfmr Input	J14 (3-pin female Molex)	See J1			

# I. Wiring Harness Pinout Table (Continued)

Harness	Connector	From	To	Wire	Signal
AC Power and Light Harness LUMILINE OR 15 W bulbs	E3 (2 LUMILINE fixtures OR 2 Bulb fixtures)	See J2			
Control Unit Harness Fire Button	P15 (2-pin male Molex)	P15-1 P15-2	E1-C E1-A	46" orange 24 ga 46" black 24 ga	Fire Ground
Monitor Video Harness Monitor Connector	P6 (12-pin male Molex)	P6-1 P6-2 P6-3 P6-4 P6-5 P6-6 P6-7 P6-8 P6-9 P6-10 P6-11 P6-12	J101-1 J101-2 J101-3 J101-4 J101-5 J101-6 J101-7 J101-8 J102-1 J102-3 J102-5 J102-2	22" 22 ga } red twisted pair } blk 22" 22 ga } grn twisted pair } blk 22" 22 ga } blu twisted pair } blk 22" 22 ga } yel twisted pair } blk 22" red 18 ga 22" brown 18 ga 22" yellow 18 ga 22" black 18 ga	Red in Ground Green in Ground Blue in Ground Composite sync Ground +5 VDC -5 VDC +12 VDC logic Ground
Monitor Video harness Video Signal	J101 (8-pin female wafer Molex)	See P6			
Monitor Video Harness Power Connector	J102 (5-pin female wafer Molex)	See P6			
+5 V Power Supply	P11 (3-pin female Molex)	P11-1 P11-2 P11-2 P11-3 P11-3	{ Power Supply PCB +VE } { Power Supply PCB -VE }	8 1/4" red 18 ga 9 1/4" black 18 ga	+5 VDC Ground

# **I. Wiring Harness Pinout Table (Continued)**

<b>Harness</b>	<b>Connector</b>	<b>From</b>	<b>To</b>	<b>Wire</b>	<b>Signal</b>
Power Supply Transformer Input	P14 (3-pin male Molex)	P14-1	Xfmr pin 4	11" black 18 ga	Hot
		P14-2	Xfmr pin 1	11" white 18 ga	Ground
		P14-3	Xfmr gnd	13 <sup>3</sup> / <sub>4</sub> " green 22 ga	Earth ground
Module Interconnect Extension Harness	P9 (6-pin female Molex)	P9-1	J16-1	102 <sup>1</sup> / <sub>2</sub> " red 22 ga	+5 VDC
		P9-2	J16-2	102 <sup>1</sup> / <sub>2</sub> " black 22 ga	Ground
		P9-3	J16-3	102 <sup>1</sup> / <sub>2</sub> " yel-blk 22 ga	Coin (norm. closed)
		P9-4	J16-4	102 <sup>1</sup> / <sub>2</sub> " wht-blk 22 ga	Coin (norm. open)
		P9-5	J16-5	102 <sup>1</sup> / <sub>2</sub> " green 22 ga	Anti-slam
		P9-6	UNUSED		
Module Interconnect Extension Harness Coin Door	J16 (6-pin Male Molex)	See P9			
Coin Door Harness Door Connector	J17 (6-pin female Molex)	J17-1	Coin Cntr bottom	13 <sup>5</sup> / <sub>8</sub> " black	
		J17-2	J19 spade cnx	22 <sup>3</sup> / <sub>4</sub> " black 22 ga	Coin (norm. closed)
		J17-3	J18 spade cnx	17 <sup>3</sup> / <sub>4</sub> " yel-blk 22 ga	Coin (norm. closed)
		J17-4	Coin Cntr top	13 <sup>5</sup> / <sub>8</sub> " black	
		J17-4	J18 spade cnx	17 <sup>3</sup> / <sub>4</sub> " wht-blk 22 ga	Coin (norm. open)
		J17-5	J20 pigtail	21 <sup>3</sup> / <sub>8</sub> " green 22 ga	Anti-slam (norm. open)
		J17-6	UNUSED		

# I. Wiring Harness Pinout Table (Continued)

Harness	Connector	From	To	Wire	Signal
Coin Door Harness Coin Drop	J18 (3 push-on connectors)	J18 norm. open	J19 spade	19 <sup>3</sup> / <sub>4</sub> " wht-blk 22 ga	Coin (norm. open)
		J18 common	J19 spade	19 <sup>3</sup> / <sub>4</sub> " orange 22 ga	Common
Coin Door Harness Coin Drop	J19 (3 push-on connectors)	J19 norm. closed	J20 common pigtail	8 <sup>5</sup> / <sub>8</sub> " black 22 ga	Coin to common (norm. closed)
Coin Door Harness Vibration	J20 (2 bare ends, soldered)	See J17, J19			
Audio Power Harness Power	P12 (3-pin male Molex)	P12-1	J21-4	12" white 18 ga	-12 VDC audio
		P12-2	J21-9	12" yel-org 18 ga	+12 VDC audio
		P12-3	J21-1	12" yel-org 18 ga	
Audio Power Harness Power	J21 (9-pin female wafer Molex)	See P12			
110/220 V Bifurcated AC Cable	J22 (3-pin male Molex)	J22-1	J23-1	7" black 22 ga	Hot
		J22-1	E4-1	7" black 22 ga	
		J22-2	J23-2	7" white 22 ga	Ground
		J22-2	E4-2	7" white 22 ga	
		J22-3	J23-3	7" green 22 ga	Earth ground
		J22-3	E4-3	7" green 22 ga	
110/220 V Bifurcated AC Cable	J23 (3-pin female Molex)	See J22			
110/220 V Bifurcated AC Cable	E4 (TFB-B butt connector)	See J22			
AC Line Cord Power In	P1 (3-pin female Molex)	P1-1	interlock spade	12 <sup>1</sup> / <sub>2</sub> " black 18 ga	Hot
		P1-2	AC plug	140" white	Ground
		P1-3	AC plug	140" green	Earth ground
AC Line Cord 3 amp Fuse	SFE	SFE-A	AC plug	147 <sup>1</sup> / <sub>4</sub> "	
		SFE-B	E5 interlock	10 <sup>3</sup> / <sub>4</sub> " red	

## J. Selected Parts List

### Complete Assemblies

Part	QTY/Game	Exidy Part #
Mother Board	1	FR77-3175
Daughter Board*	1	FR77-3185
Color Monitor, PHOTOTEK	1	FR79-2301
OR	OR	OR
Color Monitor, TEKNIKA	1	FR79-2307

\*Early model daughter boards must be ordered with an audio power harness.

### Isolation Transformers for TEKNIKA Monitor

Part	QTY/Game	Exidy Part #
Triad N67A	1	FR63-4029
OR	OR	
Triad N74A	1	
OR	OR	
Stancor GSD 250	1	
OR	OR	
Stancor P8622	1	
OR	OR	
Standard Magne- tics (open frame)	1	

### Power Supply

Part	QTY/Game	Exidy Part #
Adtech 5 V 6 amp Supply	1	FR78-3001
PC Board, As- sembled	1	FR77-3195
Transformer T911	1	FR63-4028
OR	OR	OR
Transformer T893	1	FR63-4025

### Wiring Harnesses

Part	QTY/Game	Exidy Part #
Speaker Pigtail Harness	1	FR71-2001
Control Unit Harness	1	FR71-2002
Coin Harness	1	FR71-2003
Main Harness Ass'y	1	FR71-2005
5V Pigtail Harness	1	FR71-2008
AC Input Harness to Power Supply	1	FR71-2012
Interconnect Extension Harness	1	FR71-2013
Monitor Interface Harness, early*	1	FR71-2014-1A
PHOTOTEK	1	
OR	OR	OR
Monitor Interface Harness, TEKNIKA and Late PHOTOTEK	1	FR71-2014-1B
AC Power and Light Harness	1	FR71-2015
Bifurcated AC Cable	1	FR71-2023
Fire Button Harness	1	FR71-2024
Audio Power Cable**	1	FR71-2025
TEKNIKA Monitor*** Interface Cable	1	FR71-2028
AC Line Cord and Fuse	1	FR71-2030

\*Soldered to Monitor PC board

\*\*Soldered to early model daughter boards; Molex connected to later model boards. When ordering, specify early or later model. This harness must be ordered when replacing an early model daughter board.

\*\*\*Not needed for games equipped with the PHOTOTEK monitor.

## J. Selected Parts List (Continued)

### Pre-Programmed ICs Mother Board

Part	Location	Exidy Part #
6331 PROM or equivalent	7A	FR48-2153
6331 PROM or equivalent	8A	FR48-2154

### IMPORTANT

There are three sets of STARFIRE program chips. Each STARFIRE game has just one of these sets:

- 10 EPROM chips in columns 1 and 2 of the daughter board. Each EPROM has a paper sticker on the back.
- 10 ROM chips in columns 1 and 2 of the daughter board. The chips do **not** have paper stickers, and there is no chip in socket 1F.
- 11 ROM chips in columns 1 and 2 of the daughter board. The chips do **not** have paper stickers, and there is a chip in socket 1F.

These sets are **not** interchangeable; if you must replace a program chip, be certain to order the correct replacement.

### Pre-Programmed ICs Daughter Board

Part	Location	Exidy Part #
STARFIRE game program, 10 EPROM set	1A	FR48-9013
	2A	FR48-9014
	1B	FR48-9015
	2B	FR48-9016
	1C	FR48-9017
	2C	FR48-9018
	1D	FR48-9019
	2D	FR48-9020
	1E	FR48-9021
	2E	FR48-9022

### Part Location Exidy Part #

STARFIRE game program 10 ROM set	1A	FR49-1026
	2A	FR49-1027
	1B	FR49-1028
	2B	FR49-1029
	1C	FR49-1030
	2C	FR49-1031
	1D	FR49-1032
	2D	FR49-1033
	1E	FR49-1034
	2E	FR49-1035
STARFIRE game program, 11 ROM set	1A	FR49-1015
	2A	FR49-1016
	1B	FR49-1017
	2B	FR49-1018
	1C	FR49-1019
	2C	FR49-1020
	1D	FR49-1021
	2D	FR49-1022
	1E	FR49-1023
	2E	FR49-1024
	1F	FR49-1025

### Control Unit Parts

Part	QTY/Game	Exidy Part #
Printed Control Panel	1	FR68-6040
Steering Yoke	1	FR92-1005

## J. Selected Parts List (Continued)

Control Unit Parts Continued		
Part	QTY/Game	Exidy Part#
Yoke Cover Plate	1	FR68-9015
Base Bracket	1	FR68-9004
Flanged Bearing NF-1210-32	2	FR74-5100
Steering Tube	1	FR92-1002
Steering Collar	2	FR92-1003
Steering Stop	1	FR92-1010
Centering Spring Stock Spring #273S 9/16 diam × 4 L	2	
Stainless Steel Bolt 3/8-24 × 1 3/4 L	1	
Pushbutton Switch, #930	2	FR72-3022
Control Potentio- meter (Pot), 50 K ohm Allen-Bradley (metal can)	3	FR54-5027
OR	OR	OR
Control Potentio- meter, (Pot), 50 K ohm CTS (plastic body)	3	FR54-5028
Square Shaft Bearing, Nylon	1	FR92-1001
Yaw (Horizontal) Pot Bracket	1	FR68-9001
Yaw Pot Square Shaft	1	FR92-1004
Pitch (Vertical) Pot Bracket	1	FR68-9002
Pitch Link	1	FR68-9003
Pitch Link Spring Stock Spring #248S 11/32 diam × 2 1/2 L	1	

Part	QTY/Game	Exidy Part#
Cotter Pin 3/32 × 3/4 L	1	
Thrust Bracket	1	FR68-9005
Thrust Pivot	1	FR68-9006
T-handle	1	FR92-1006
Grooved Pin (type C) 1/4 diam × 2" Bearing Engineer- ing	1	FR74-5151
Grooved Pin (type C) 1/4 diam × 3/4" Bearing Engineer- ing	1	FR74-5152
T-handle Sleeve	1	FR92-1012
Thrust Rail	1	FR68-9007
Spring, Thrust Rail Century #C514	2	
Shoulder Screw, Thrust Rail 1/4 diam 1 L 10-32 Slot Head, Bearing Specialties #PL-25	2	FR74-5156

### Cabinet Parts Video Module

Part	QTY/Game	Exidy Part #
Logo Plastic Panel	1	FR75-4003
CRT Display Plastic Panel	1	FR75-4004
Formed Paper Bezel	1	FR76-1055
Vinyl Side Panel, Planet & Fighters	1	FR76-1045

## J. Selected Parts List (Continued)

### Cabinet Parts, Video Module Continued

Part	Qty/Game	Exidy Part #
Vinyl Side Panel, Explosion	1	FR76-1675
8" 8 ohm 10 oz Speaker	1	FR62-7050
7" Speaker Grill	1	FR68-9016
LUMILINE Lamp*	1	FR70-6023
LUMILINE Lamp Fixture*	2	FR70-6024
PC Board Mount	1	FR76-1054

\*Early models only. Later models have two 15W bulbs and bulb fixtures.

### Cabinet Parts, Passenger Module

Part	QTY/Game	Exidy Part #
P/M Plastic Panel	1	FR75-4005
Vinyl Side Panel, Fighter	1	FR76-1062
Vinyl Back Panel, STARFIRE Logo	1	FR76-1064
Vendall Double Coin Door	1	FR66-4003
Coin Box	1	FR68-9014
Shipping Carton Brace	1	FR76-1054
U-bracket (Cabinet Clip)	2	FR68-9012



